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NRO REVIEW COMPLETED

9 APR 1963

MEMORANDUM FOR : Deputy Director (Research)  
SUBJECT : Longer Focal Length Cameras for U-2  
REFERENCE : Memorandum for DD/OSA from DD/R, dated  
26 March 1963, same subject as above,  
[redacted]

1. The limiting factors on the ground resolution of the "B" camera in the U-2 are not so much identified with focal length as they are with lens aperture, vehicle stability, and photographic coverage. Increasing the size of the lens aperture permits the use of a higher shutter speed or a higher resolution (but less light sensitive) film. Either of these approaches reduces the effects of aircraft roll, pitch, and yaw instability; however, the amount of photographic coverage will also be reduced due to the smaller angular coverage of the lens.

2. Several approaches have been examined to increase the ground resolution for the Cuban requirement.

a. A lower speed shutter has been developed and tested for the "B" camera that will permit the use of the higher resolution SO-130 film. This combination, however, is useful only at high sun angles (30° or more) and may suffer somewhat from image movement due to aircraft instability.

b. A proposal has been received from Eastman to adapt their "O" camera to the U-2 configuration, using their present 21" lens SO-132 film and a shutter speed of 1/160 to 1/200th. This system would provide over 1,000 nautical miles of linear coverage with a ground resolution of 1 1/4 feet. The disadvantages of this approach are:

(1) Time - delivery in approximately six months.

(2) Cost - their quote based on six cameras was [redacted] which would make one unit in the neighborhood of [redacted]

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(3) A shorter delivery might be realized by diverting one of the three cameras presently on order for the "O" program, but this would be at the expense of "O" program assets already in short supply.

c. The Hycon 333 camera being procured in a quantity of three for the "O" program looks promising with a 48" lens and projected ground resolution of 1'; but, the first of these will not be delivered until August 1963 or later, and it is an unproved system.

d. Itek has been asked to prepare a proposal using the CORONA camera in the IDEALIST vehicle. Preliminary analyses indicate that such an installation might be accomplished within two and one-half to three months. Costs have not yet been examined, but it appears that such an installation might be made for [redacted] Their projected ground resolution was one foot from 75,000' altitude, however, the roll, pitch and yaw rates of the vehicle might degrade this figure somewhat.

e. Eastman Kodak, also, has been asked to review the possibility of using an E-6 camera in a U-2.

f. For the immediate future, there are several possibilities, all of which involve adapting existing cameras to existing lenses and reducing the amount of lateral and linear coverage in favor of obtaining maximum resolution over a rather small target, less than four miles wide and 200 miles long. Such an installation could probably be provided by 10 May in a U-2 and as an estimate would afford better than two feet ground resolution.

3. The foregoing is an interim reply to referenced memorandum. Upon receipt of Itek and Eastman Kodak proposals relating to possible use of CORONA and E-6 systems, recommendations will be forwarded concerning suggested courses of action for your consideration.

SIGNED

JACK C. LEDFORD  
COLONEL, USAF  
Assistant Director  
(Special Activities)

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